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(54) Title: TRANSGENIC PLANTS USED AS A BIOREACTOR SYSTEM

(57) Abstract: The present invention relates generally to the use of plants as bioreactors for the production of molecules having useful properties such as *inter alia* polymers, metabolites, proteins, pharmaceuticals and nutraceuticals. More particularly, the present invention contemplates the use of grasses, and even more particularly C4 grasses, such as sugar-cane, for the production of a range of compounds such as, for example, polyhydroxyalkanoates, pHBA, vanillin, indigo, adipic acid, 2-phenylethanol, 1,3-propanediol, sorbitol, fructan polymers and lactic acid as well as other products including, *inter alia*, other plastics, silks, carbohydrates, therapeutic and nutraceutic proteins and antibodies. The present invention further extends to transgenic plants and, in particular, transgenic C4 grass plants, capable of producing the compounds noted above and other products, and to methods for generating such plants. The ability to utilize the high growth rate and efficient carbon fixation of C4 grasses is advantageous, in that it obviates the significant growth penalties observed in other plants, and results in high yields of desired product without necessarily causing concomitant deleterious effects on individual plants. In addition, the C4 grass, sugarcane, is particularly advantageous, as in addition to the features common to all C4 grasses, this plant accumulates sucrose. This sucrose store provides a ready supply of carbon based compounds and energy which may further obviate any deleterious effects on the growth of the plant associated with the production of the product. The present invention provides, therefore, a bioreactor system comprising a genetically modified plant designed to produce particular metabolic or biosynthetic products of interest.

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